Productivity Drives Performance in Handheld Oscilloscopes

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The need to increase productivity and energy efficiency is today driving more and more electronic content into industrial applications such as power generation, transmission and distribution (e.g., smart grid), industrial process control and automation, instrumentation, HVAC, and fire and surveillance, just to name a few. As evidence of this fact consider that in a 2007 IPC market research report, the industrial electronics market topped $174 billion. While the increased electronic content provides a number of critical benefits, it also poses difficult challenges for field engineers and technicians in terms of installation and maintenance (I&M).

When these challenges arise in the field, the handheld oscilloscope is often the engineer’s first line of defense, enabling them to quickly and effectively troubleshoot electronics. In this scenario, the oscilloscope allows the engineer to observe the exact wave shape of an electrical signal. In addition to the amplitude of the signal, the oscilloscope can also show distortion and measure frequency, time between two events (such as pulse width or pulse rise time), and relative timing of two related signals. In other words, it adds the time dimension to digital multimeter (DMM) measurements. As an analogy, consider that the DMM is like a still camera while the oscilloscope is like a video recording, essentially acting as the human “eye” to electrical signals. This ability to “see” electrical signals, makes the oscilloscope all the more important when it comes to troubleshooting industrial applications. Unfortunately though with the increasing electronic content, this task is not quite as easy as it sounds.

Luckily, a number of trends have emerged in the handheld oscilloscope market that are making it easier for this critical instrument to more effectively and efficiently address the challenges engineer’s face when troubleshooting electronics in the field. These trends include:

Figure 1. The U1600A Series handheld oscilloscope from Agilent Technologies offers a 200-MSa/s sampling rate and 125 KB of memory, which is among the highest sampling rate and one of the deepest memory depths for a handheld oscilloscope in its category. It also features a 4.5-inch color LCD and a USB 2.0 port to allow direct connection to the PC or for data to be saved to a USB drive.

* Emergence of color displays. In the field, engineers need to be able to gain as much information as possible from their oscilloscope. A color display is key to meeting this need. Imagine, for example, that you could only see in black and white. Think about the significant amount of detail you would lose simply by not being able to see the world around you in color. Now imagine what it’s like for the engineer to only view measurement data in black and white. By simply adding a color display to the oscilloscope, this human “eye” to electrical signals instantly gains a much clearer view. Furthermore, since handheld oscilloscopes usually have at least two input channels, a color display is absolutely essential to being able to easily differentiate both waveforms when they are displayed simultaneously.

* Display size. The size of the oscilloscope’s display is directly related to the amount of detail the engineer can view. The larger the display, the more details that can be obtained. Therefore, in order to provide the engineer a clearer picture of any potential problem in the field, handheld oscilloscopes will need to incorporate larger displays.

* Increased sampling rate and deep memory depth. While handheld scopes are typically known for their ultra high portability, simplicity and incorporated DMM features, to be truly effective they need a high enough sampling rate and deep memory depth. A high sampling rate is required for the instrument to capture glitches. Deep memory allows the instrument to capture signals at a high sample

rate over a larger time base. In some cases, a handheld oscilloscope's sampling rate and memory depth may even match that of its bench top counterparts (Figure 1).

* Inclusion of Universal Serial Bus (USB) ports. Over the years, USB has become an important standard for enabling data transfer and connectivity. In fact, these days all PCs have at least 2 USB ports for this very reason. For reporting purposes and in order for the field engineer and technician to perform further in depth analysis on the acquired waveforms, the handheld oscilloscope should also have the capability to provide a safe and isolated USB connection to the PC to download necessary data.

As electronic contents become more prevalent in industrial applications, the need for handheld oscilloscopes will only increase. A number of emerging trends are now empowering current and future oscilloscopes with the capabilities necessary to more productively and effectively meet the challenges that such increased electronic content creates. The task now falls to the measurement company to ensure that their instruments fully support these trends. Such instruments are quickly becoming absolutely crucial to the commercial success of industrial applications.

About the Author
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